



ITGB4 gene

integrin subunit beta 4

Normal Function

The *ITGB4* gene provides instructions for making one part (the $\beta 4$ subunit) of a protein known as an integrin. Integrins are a group of proteins that regulate the attachment of cells to one another (cell-cell adhesion) and to the surrounding network of proteins and other molecules (cell-matrix adhesion). Integrins also transmit chemical signals that regulate cell growth and the activity of certain genes.

The integrin protein made with the $\beta 4$ subunit is known as $\alpha 6\beta 4$ integrin. This protein is found primarily in epithelial cells, which are cells that line the surfaces and cavities of the body. The $\alpha 6\beta 4$ integrin protein plays a particularly important role in strengthening and stabilizing the skin. It is a component of hemidesmosomes, which are microscopic structures that anchor the outer layer of the skin (the epidermis) to underlying layers. As part of a complex network of proteins in hemidesmosomes, $\alpha 6\beta 4$ integrin helps to hold the layers of skin together.

Health Conditions Related to Genetic Changes

epidermolysis bullosa with pyloric atresia

At least 60 mutations in the *ITGB4* gene have been found to cause epidermolysis bullosa with pyloric atresia (EB-PA). In addition to skin blistering, people with EB-PA are born with a life-threatening obstruction of the digestive tract called pyloric atresia. Mutations in the *ITGB4* gene account for about 80 percent of all cases of EB-PA.

ITGB4 gene mutations alter the normal structure and function of the $\beta 4$ integrin subunit or prevent cells from producing enough of this subunit. As a result, $\alpha 6\beta 4$ integrin is defective or missing. Mutations that lead to a complete or near-complete loss of $\alpha 6\beta 4$ integrin tend to cause more severe signs and symptoms of EB-PA, while mutations that alter the structure or stability of this protein usually cause milder signs and symptoms. A shortage of functional $\alpha 6\beta 4$ integrin causes cells in the epidermis to be fragile and easily damaged. Friction or other minor trauma can cause the skin layers to separate, leading to the widespread formation of blisters. It is less clear how mutations in the *ITGB4* gene are related to pyloric atresia.

cancers

Researchers believe that $\alpha 6\beta 4$ integrin may play a critical role in the progression of cancerous tumors called carcinomas. These cancers arise in epithelial cells and can affect many tissues and organs, including the breast, lung, liver, colon, and skin.

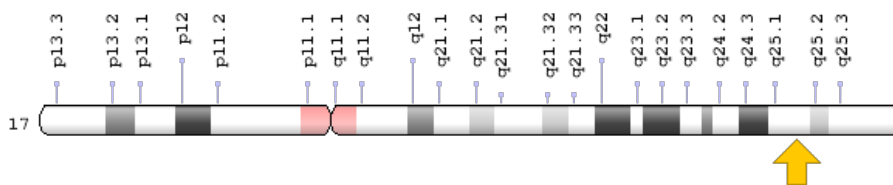
Changes in the location and activity of $\alpha 6\beta 4$ integrin within cancer cells are associated with the progression of carcinomas. The integrin protein activates key signaling molecules, which trigger cancer cells to migrate through the body and invade other tissues. These signals also make cancer cells more resistant to self-destruction (apoptosis).

Recent studies suggest that, in addition to its role in the progression of existing carcinomas, $\alpha 6\beta 4$ integrin may be involved in the initial formation of these tumors.

Chromosomal Location

Cytogenetic Location: 17q25.1, which is the long (q) arm of chromosome 17 at position 25.1

Molecular Location: base pairs 75,721,328 to 75,757,819 on chromosome 17 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- CD104
- CD104 antigen
- GP150
- integrin beta 4
- integrin beta-4 subunit
- Integrin beta(4)
- Integrin beta4
- integrin, beta-4

- integrin, beta 4
- ITB4_HUMAN
- Lymphocyte antigen CD104

Additional Information & Resources

Educational Resources

- Madame Curie Bioscience Database: Integrins in Cancer Cell Invasion
<https://www.ncbi.nlm.nih.gov/books/NBK6070/>
- Madame Curie Bioscience Database: Integrins: An Overview of Structural and Functional Aspects
<https://www.ncbi.nlm.nih.gov/books/NBK6259/>
- Molecular Biology of the Cell (fourth edition, 2002): Integrins
<https://www.ncbi.nlm.nih.gov/books/NBK26867/>

GeneReviews

- Epidermolysis Bullosa with Pyloric Atresia
<https://www.ncbi.nlm.nih.gov/books/NBK1157>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28ITGB4%5BTIAB%5D%29+OR+%28integrin+%5BTiab%5D+AND+beta+4+%5BTiab%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D>

OMIM

- INTEGRIN, BETA-4
<http://omim.org/entry/147557>

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
http://atlasgeneticsoncology.org/Genes/GC_ITGB4.html
- ClinVar
<https://www.ncbi.nlm.nih.gov/clinvar?term=ITGB4%5Bgene%5D>
- HGNC Gene Family: CD molecules
<http://www.genenames.org/cgi-bin/genefamilies/set/471>
- HGNC Gene Family: Fibronectin type III domain containing
<http://www.genenames.org/cgi-bin/genefamilies/set/555>

- HGNC Gene Family: Integrin beta subunits
<http://www.genenames.org/cgi-bin/genefamilies/set/1159>
- HGNC Gene Symbol Report
http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=6158
- NCBI Gene
<https://www.ncbi.nlm.nih.gov/gene/3691>
- UniProt
<http://www.uniprot.org/uniprot/P16144>

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